

UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF COLUMBIA

UNITED STATES OF AMERICA,	)	
Department of Justice	)	
Antitrust Division	)	
1401 H Street, N.W., Suite 3000	)	
Washington, DC 20530,	)	
	)	
Plaintiff,	)	Civil No.: 1:97CV02397
	)	
v.	)	
	)	Filed: 10/16/97
RAYTHEON COMPANY,	)	
141 Spring Street	)	
Lexington, MA 02173,	)	
	)	
GENERAL MOTORS CORPORATION,	)	
3044 West Grand Boulevard	)	
Detroit, MI 48202,	)	
	)	
and	)	
	)	
HE HOLDINGS, INC.,	)	
3044 West Grand Boulevard	)	
Detroit, MI 48202,	)	
	)	
Defendants.	)	

**COMPLAINT**

The United States of America, acting under the direction of the Attorney General of the United States, brings this civil action to obtain equitable relief against defendants and alleges as follows:

1. The United States brings this antitrust case to block the proposed combination of Raytheon Company ("Raytheon") and Hughes Aircraft Company ("Hughes") a wholly owned

subsidiary of HE Holdings, Inc. ("HE Holdings") and an indirect subsidiary of General Motors Corporation ("General Motors"). Raytheon and Hughes are the only two firms that design, develop, and produce second generation ("2nd Gen.") electro-optical ("EO") systems for Department of Defense ("DoD") ground applications. Raytheon and Hughes are also the only two firms that design, develop, and produce critical infrared ("IR") detectors, called "SADA II" detectors, used in ground EO systems, and are the leading firms that develop and produce staring IR detectors used for sensors in missile seeker heads and aircraft and missile warning system applications.

2. If Raytheon acquires Hughes, it will obtain a monopoly in the production of ground EO systems for all current Army programs. If Raytheon acquires Hughes, it will also obtain a monopoly in the production of SADA II detectors, eliminate its most significant competitor, and become a dominant firm in staring IR detectors. Unless blocked, this combination will likely result in less innovation and increases in prices paid by the DoD.

3. In addition, Hughes and Raytheon are competing with each other for the Follow-on-to-TOW ("FOTT") new advanced antitank missile program that will replace the current inventory of TOW antitank missiles. Raytheon is competing as the majority owner of a joint venture with another large aerospace contractor, Lockheed Martin Corporation ("Lockheed Martin"). Having both the Hughes and Raytheon/Lockheed Martin FOTT teams under the control of the same company likely will lessen competition for the FOTT contract.

## I. JURISDICTION AND VENUE

4. This action is filed by the United States under Section 15 of the Clayton Act, as amended, 15 U.S.C. § 25, to prevent and restrain the defendants from violating Section 7 of the Clayton Act, as amended, 15 U.S.C. § 18.

5. Both Raytheon and Hughes design, develop, and produce IR sensing systems for military platforms and sell those products to either platform manufacturers or DoD, an agency of the United States. Raytheon and Hughes are engaged in interstate commerce and in activities substantially affecting interstate commerce. The Court has subject matter jurisdiction over this action and jurisdiction over the parties pursuant to Section 12 of the Clayton Act, 15 U.S.C. § 22, and 28 U.S.C. §§ 1331 and 1337.

6. The defendants transact business and are found within the District of Columbia. Venue is proper in this District under 15 U.S.C. § 22 and 28 U.S.C. § 1391(c).

## II. THE DEFENDANTS

7. Raytheon is a Delaware corporation headquartered in Lexington, Massachusetts. Raytheon produces heavy construction equipment; refrigerators and freezers; radio and TV broadcasting and communications equipment; semiconductors and related devices; aircraft; guided missiles and space vehicles; search, detection and navigation systems; and engineering services. Raytheon TI Systems ("RTIS"), a division of Raytheon, produces ground EO systems at a facility in McKinney, Texas and IR detectors at its Expressway facility in Dallas, Texas. Amber, a separate unit of Raytheon, produces detectors at a facility in Goleta, California. In 1996, Raytheon reported total sales of about \$12 billion.

8. General Motors is a Delaware corporation headquartered in Detroit, Michigan. Hughes, a missile and defense electronics company, is an indirect subsidiary of General Motors. Hughes produces ground EO systems at facilities in El Segundo, California and LaGrange, Georgia. Hughes operates the industry's premier detector facility, Santa Barbara Research Center ("SBRC"), in Santa Barbara, California. In 1996, Hughes reported total sales of approximately \$6 billion.

9. HE Holdings is a Delaware corporation headquartered in Detroit, Michigan. Hughes is a direct subsidiary of HE Holdings.

### III. TRADE AND COMMERCE

#### A. RELEVANT PRODUCT MARKETS

##### SADA II Detectors

10. An IR detector is a device that converts IR radiation into an electrical signal. IR sensing devices detect the differences in the heat emissions between an object and its surroundings, and can therefore distinguish among objects in the device's field of view. The detector consists of linear or mosaic arrays of individual diodes made from semiconductor materials such as mercury cadmium telluride ("MCT") or indium antimonide ("InSb"). The detector is attached to a silicon chip or "readout" device that contains the circuitry which stores the energy captured by the detector and converts this energy to a voltage signal. When mated to the readout circuit, the detector is often called a focal plane array ("FPA"). The FPA is typically housed in an evacuated dewar which provides cooling to the FPA.

11. The combination of an FPA, dewar cooler assembly, optics, electronics, software, and a visual display is commonly called a FLIR (Forward Looking Infrared). FLIRs

are used in ground and airborne EO systems for surveillance and weapons fire control purposes. FPAs are also used in heat-seeking missile guidance systems and missile warning systems, applications for which no pictorial image is required. Since the Gulf War, great strides have been made in IR technology, and the military is switching from older first generation ("1st Gen.") lower performance technology to more advanced 2nd Gen. technology in a variety of applications.

12. Second generation scanning FPAs consist of detectors arranged in two dimensions, and the array may range in size from 240 x 2 to 480 x 4. The detector is scanned mechanically with mirrors across a field of view. Second generation scanning FPAs differ from 1st. Gen. scanning FPAs in that the readout circuit is mounted directly to the detector material. Second generation FPAs are photovoltaic, while 1st. Gen. FPAs are photo conductive. Scanning FPAs are used on ground vehicles because of their ability to cover a wide field of view.

13. Staring or third generation ("3rd Gen.") FPAs consist of a mosaic of diodes typically square or rectangular in shape. Since they contain no scanning mechanism, staring FPAs provide an image by staring at the scene and rapidly updating changes in the scene. Staring FPAs are lighter weight than scanning, and they can be more economical to use. Staring FPAs are produced in sizes ranging from 64 x 64 to 1024 x 1024. The largest size currently produced for tactical applications, however, is 640 x 480.

14. FPAs are distinguished by the spectrum of the electromagnetic wavelength they detect -- longwave ("LW"), midwave ("MW") or shortwave ("SW"). LW is visible in the 8 to 12 micron range, MW in the 3 to 5 micron range, and SW in the 1 to 2 micron range.

Short wave is not typically used for tactical applications. InSb is the primary material used for detecting MW IR radiation, and it is only used in staring arrays. MCT, the leading material for detecting LW IR radiation, is used in virtually all scanned arrays, but is also used in staring FPAs.

15. In the late 1960s, DoD started to develop an IR detector common across all the services. This effort resulted in the 1st Gen. "common module" detectors, which were placed in the field in approximately 1970. Since the common module detector is not mounted directly to a integrated readout circuit, fewer detector elements can be placed on the array. Because it has fewer detector elements, the sensitivity and resolution of 1st Gen. FPAs are not as good as that of 2nd Gen. FPAs. First generation detectors were used in Desert Storm, and it was discovered that U.S. weaponry could fire further than the FLIR systems could see. The desire for EO systems with a range closer to that of the weapon systems motivated the development of 2nd Gen. devices. First generation FPAs are still in use today, although in the early 1990s, the U.S. military stopped placing new 1st Gen. FLIRs in the field.

16. In the late 1980s, the Army's Night Vision Laboratory began development of 2nd Gen. detectors under the Standardized Advanced Dewar Assembly ("SADA") program. SADA assemblies use a two dimensional MCT array sensitive to LW IR radiation. SADA detectors include four different configurations: SADA I, SADA II, SADA III A and SADA III B. Each type has different specifications so that one does not substitute for another.

17. The Army uses a SADA II for ground vehicles. As part of a broader effort undertaken in 1992 to insert a common 2nd Gen. FLIR system into various battlefield platforms, the Army decided to use SADA II detectors in the M1A2 Abrams Tank, the M2A3

Bradley Fighting Vehicle, and the Long Range Advanced Scout Surveillance System ("LRASSS"). The SADA II is also used in the FLIR for the Improved Targeting Acquisition System ("ITAS") for the High Mobility Motorized Wheeled Vehicle ("HMMWV").

18. Because they do not match the field of view achievable with SADA II detectors, staring FPAs are not viable substitutes for SADA II detectors. Staring FPAs of a size needed to match the field of view obtainable from a scanning FPA are not yet available in LW MCT, which is the only material that meets the Army's needs to see through battlefield smoke, dust, and clutter.

19. Even if large format LW MCT arrays became available in the future, a switch to such arrays would not be economically justified in response to a small but significant and nontransitory price increase in the SADA II detectors, because of the substantial configuration changes and consequent costs required to replace SADA II detectors in ground vehicles with staring detectors.

20. The development, production, and sale of SADA II detectors is a line of commerce and a relevant product market within the meaning of the Clayton Act.

#### Staring FPAs

21. Staring FPAs provide greater sensitivity and resolution than scanning FPAs because they have a larger number of detectors. However, staring FPAs are more difficult to produce than scanning FPAs because of the difficulty in producing large InSb or MCT wafers. Due to their smaller physical size and lighter weight, staring FPAs are used in missile seeker heads and airborne applications where small size and light weight are a premium. Staring FPAs are also the detector of choice for missile warning systems.

22. Staring FPAs have primarily been made of InSb because it was the first technology capable of producing staring FPAs and the material itself is easier to work with. Staring FPAs are now available using MCT technology.

23. The development, production, and sale of staring FPAs is a line of commerce and a relevant product market within the meaning of the Clayton Act.

#### 2nd Gen. Ground EO Systems

24. A ground EO system is an integrated system with a thermal image (usually a FLIR), including an integrated cooler dewar assembly with detector, afocal assemblies, and associated electronics. It might also include the optics, electronics, software, visual displays, fire control, and stabilization necessary to fit the system into a particular platform.

25. Targeting and navigation are the two major types of ground infrared EO systems. Targeting systems, sometimes called "fire control systems," acquire the target and direct the missile or gun round to the target. These systems are much more complex than those used for navigation, which only need to permit the operator to see the general area.

26. A ground EO system operating in or on a ground combat vehicle, in the dust, heat and smoke of a battlefield, faces risks and demands that are different from those faced by an EO system on a fighter aircraft or a helicopter operating substantially above the battlefield. Many problems that are unique to designing EO systems for the ground combat environment are not faced in designing an EO system for airborne applications. Among these is the requirement that any FLIR on a tank be able to absorb the tremendous shock of a direct hit and keep functioning. In addition, the shock of the recoil of the gun and the extreme vibrations that constantly accompany the operation of a ground combat vehicle must also be accounted



for in designing and producing a ground EO system. An EO system operating on the ground may also have to see through several miles of battlefield smoke and debris. For these reasons, the Army spent over \$90 million in the early 1990 specifically to develop an EO system for its ground vehicles.

27. The development, production, and sale of ground EO systems is a line of commerce and a relevant product market within the meaning of the Clayton Act.

#### FOTT PROGRAM

28. FOTT is a U.S. Army engineering, manufacturing, and development ("EMD") program for an advanced missile to replace the current inventory of TOW anti-tank missiles. The program started on March 30, 1995 when the Army issued a Request for Information. An initial draft Request for Proposal was issued on May 15, 1996, a second draft Request for Proposal was issued on February 12, 1997, and a third draft Request for Proposal was issued on August 8, 1997. The Army currently anticipates issuing a formal Request for Proposal for the FOTT program at the end of 1997 or early 1998. A contract for EMD is expected to be awarded in the first half of 1998. Hughes and a joint venture between RTIS and Lockheed Martin, in which RTIS owns a 60% interest, are competing for the FOTT program.

29. The U.S. Army has determined that development of an advanced anti-tank missile is necessary and that no other missile system meets the mission objectives set for the FOTT program.

30. The development, production, and sale of FOTT missiles is a line of commerce and a relevant product market within the meaning of the Clayton Act.

## B. RELEVANT GEOGRAPHIC MARKET

31. Ground EO systems and SADA II detectors are purchased directly by DoD, and staring FPAs are purchased by missile and aircraft producers for inclusion in weapon systems sold to DoD. In addition, the FOTT missile is expected to be purchased by DoD. In purchases of ground EO systems, SADA II detectors, and staring FPAs, DOD relies on domestic suppliers. Currently, there are no foreign producers to which DoD could turn in the face of a small but significant and non-transitory price increase by domestic ground EO, qualified SADA II, or staring FPA suppliers. In addition, there is no foreign producer for the FOTT missile to which the DoD is likely to turn in the face of a small but significant and non-transitory price increase by domestic suppliers.

32. The United States is a relevant geographic market within the meaning of Section 7 of the Clayton Act.

## C. ANTI-COMPETITIVE EFFECT AND ENTRY

### SADA II Detectors

33. Raytheon and Hughes are the only two firms that have sold SADA II detectors to DoD. Hughes was qualified as a SADA II supplier in mid-1996, and Raytheon was permitted to bid for 1997 purchases based on its demonstrated success toward completing the qualification process. Raytheon is expected to be fully qualified by the end of 1997.

34. DoD projects purchases of 2,945 SADA II detectors through the year 2002, having a total dollar value of about \$138.8 million. In 1997, about 103 SADA II detectors having a total dollar value of about \$6.6 million were purchased, of which 70 percent were supplied by Hughes and 30 percent by RTIS.

35. Raytheon's acquisition of Hughes would eliminate all competition in the development, production, and sale of SADA II detectors. The proposed acquisition will result in a single supplier with the incentive and ability to raise prices and little or no incentive to minimize cost.

36. Successful entry into the production and sale of SADA II detectors is difficult, time consuming, and costly. A potential entrant would have to design and develop a product, establish production processes, and complete a rigorous qualification process. A new facility capable of producing SADA II detectors could cost over \$20 million. Only one other firm, Sofradir of France, is trying to qualify under the SADA II program. Sofradir, which is partially owned by the French government, is beginning the qualification process. It is unrealistic to expect sufficient new entry in a timely fashion to protect competition in upcoming SADA II purchases.

#### Staring FPAs

37. Raytheon and Hughes are the two leading suppliers of staring FPAs for military programs. Raytheon produces staring FPAs at its RTIS facility in Dallas, Texas and its Amber facility, in Goleta, California. Hughes operates SBRC, the industry's premier staring FPA facility, in Santa Barbara, California. Hughes and Raytheon have supplied or are contracted to supply the staring FPAs on most DoD missile and aircraft programs. DoD projects purchases of about 14,000 staring FPAs over the next five years having a value of about \$35 million.

38. Raytheon's acquisition of Hughes would combine the two leading suppliers of staring FPAs with over 90 percent of the market. The acquisition would create a clear

dominant supplier with the incentive and ability to raise prices and little or no incentive to minimize cost.

39. Boeing Company ("Boeing") and Lockheed Martin make staring FPAs for military applications, but neither is a major supplier in the tactical market. Boeing has focused on space applications, where the FPA must meet more rigid durability and quality standards. Consequently, FPAs for space applications cost significantly more than FPAs for tactical applications. Lockheed Martin operates a very small, research-oriented staring FPA operation. Boeing would need to refocus its staring FPA business from the higher price space applications and Lockheed Martin would need to invest in a production-oriented facility in order for either to be a more significant supplier in the tactical market.

40. Successful entry into the production and sale of staring FPAs is difficult, time consuming, and costly. A potential entrant would have to design and develop a product and establish production processes. A new facility capable of producing staring FPAs could cost over \$20 million. It is unrealistic to expect new entry in a timely fashion to protect competition in upcoming staring FPA purchases.

41. The acquisition also likely will result in lessening of competition in the market for missile systems. Raytheon and Hughes are not only suppliers of staring FPAs, but are also major suppliers of the missile systems of which these devices are critical components. With the acquisition of Hughes, Raytheon will control access to virtually all currently viable staring FPAs for tactical applications. Raytheon will have an incentive to refuse to sell, or to sell on disadvantageous terms, its state-of-the-art staring FPAs to its missile competitors. Without

access to the latest staring FPAs, a missile manufacturer is at a serious competitive disadvantage.

#### 2nd Gen. Ground EO Systems

42. Raytheon and Hughes are the only two firms that develop and produce 2nd Gen. EO systems for ground vehicles. Raytheon's RTIS and Hughes are the only two firms that have established the developmental capacity and low-cost production processes needed to economically produce 2nd Gen. ground EO systems.

43. During the next five years, DoD expects to spend about \$200 million a year for 2nd Gen. ground EO systems to be purchased for the following programs: the Improved Target Acquisition System for the HMMWV; the Improved Bradley Acquisition System for the Bradley Fighting Vehicle; the Commander's Independent Thermal Viewer for the M1 Abrams tank; the Thermal Independent Sight for the M1 Abrams tank; the Commander's Independent Viewer for the Bradley Fighting Vehicle; and the Long Range Advanced Scout Surveillance System. Raytheon and Hughes are the only sources for these ground EO systems.

44. Raytheon's acquisition of Hughes would eliminate all competition in the development, production, and sale of 2nd Gen. ground EO systems for military applications. The proposed acquisition will result in a single supplier with the incentive and ability to raise prices and little or no incentive to minimize cost.

45. Successful entry into the production and sale of 2nd Gen. ground EO systems is difficult, time consuming, and costly. Entry requires advanced technology, skilled engineers and specialized equipment. A potential entrant would have to engage in difficult, expensive, and time consuming research to develop and produce 2nd Gen. ground EO systems. It is

unrealistic to expect new entry in a timely fashion to protect competition in upcoming 2nd Gen. ground EO system purchases.

#### FOTT Program

46. If Raytheon acquires Hughes, it will control the Hughes FOTT proposal and it will control a 60 percent interest in the RTIS/Lockheed Martin joint venture FOTT proposal. In such a situation, Raytheon has a strong economic incentive to favor its Hughes proposal, where it stands to win 100 percent of the program, over the team in which it has only a 60 percent interest. Raytheon's acquisition of Hughes will eliminate the aggressive competition that would otherwise exist between these independent teams. FOTT is a potential \$8 billion to \$10 billion program.

47. It would be very difficult for another firm to successfully enter the FOTT competition at this stage. The Hughes and RTIS/Lockheed Martin joint venture teams have completed the validation and demonstration stage and have each spent over \$20 million during the last three years developing a missile to demonstrate during the EMD selection. Selection of a contractor for the EMD contract is expected during the first half of 1998.

#### IV. VIOLATION ALLEGED

48. The effect of Raytheon's proposed acquisition of Hughes is to lessen competition substantially and tend to create a monopoly in interstate trade and commerce in violation of Section 7 of the Clayton Act.

49. The transaction likely will have the following effects among others:

- a. competition generally in development, production, and sale of SADA II detectors in the United States would be lessened substantially;
- b. actual and future competition between Raytheon and Hughes in the sale of SADA II detectors in the United States would be eliminated;
- c. prices for SADA II detectors in the United States would likely increase;
- d. competition generally in development, production, and sale of staring FPAs in the United States would be lessened substantially;
- e. actual and future competition between Raytheon and Hughes in the sale of staring FPAs in the United States would be eliminated;
- f. prices for staring FPAs in the United States would likely increase;
- g. competition generally in the innovation, development, production, and sale of ground EO systems in the United States would be lessened substantially;
- h. actual and future competition between Raytheon and Hughes in the development, production, and sale of ground EO systems in the United States would be eliminated;
- i. prices for ground EO systems in the United States would likely increase;
- j. competition generally for the FOTT missile program would be lessened substantially;
- k. actual and future competition between Raytheon and Hughes in the development, production, and sale of the FOTT missile in the United States would be eliminated; and

- l. prices for the FOTT missile in the United States would likely increase.

#### V. REQUESTED RELIEF

Plaintiff requests:

1. That the proposed acquisition by Raytheon of Hughes be adjudged to violate Section 7 of the Clayton Act, as amended 15 U.S.C. § 18;
2. That the defendants be permanently enjoined and restrained from carrying out the Agreement and Plan of Merger by and Between HE Holdings, Inc. and Raytheon Company, dated January 16, 1997, or from entering into or carrying out any agreement, understanding or plan, the effect of which would be to combine the SADA II, staring FPA, ground EO systems, or FOTT businesses or assets of Raytheon and Hughes;
3. That plaintiff be awarded its costs of this action; and
4. That plaintiff have such other relief as the Court may deem just and proper.

Dated: October 16, 1997.



Respectfully submitted,

FOR PLAINTIFF UNITED STATES:

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